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NOTICES FROM THE LICK OBSERVATORY.

PREPARED BY MEMBERS OF THE STAFF.

THE DISTRIBUTION OF LAND AND WATER ON *MARS*.

[Extract from a private letter of Professor SCHIAPARELLI to Professor HOLDEN dated April 5, 1893. Printed by permission.]

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“ You ask me my opinion of the idea of Professor SCHAEBERLE that the yellow areas of *Mars* correspond to the seas, and the dark patches to continents. I must declare that the whole result of my studies upon this planet is to induce me to reject this opinion. When we look at a body of deep water (the sea or a lake) from a height nearly vertically above it we invariably find it to be of a very dark shade. This is well known to all Alpine travellers. When one of the deep lakes, which abound in those mountains, is viewed from above, it appears as black to the eye as the ink which I am using at this moment, while the surrounding rocks appear far less dark when they are illuminated by the Sun. The cause of this is that the surface of pure water reflects barely $\frac{1}{10}$ of the incident vertical rays of light; the other $\frac{9}{10}$ enter the water, where they are completely absorbed if the water is 100 or 150 mètres in depth. From this I conclude that if seas exist in *Mars*, and if they are composed of a transparent liquid, it is beyond doubt that they would exercise a similar effect on light and absorb it almost completely. But if these seas were composed of milk or of melted sulphur, for example, my reasoning would naturally be without value.

Another argument in this question is furnished by the northern polar cap of *Mars*. As shown by my planisphere this cap is situated in the yellow regions of the planet. As this cap is in the process of diminution, it appears bordered by a dark zone which narrows progressively as the cap narrows, and only disappears when the polar cap has almost vanished. I suppose that

this dark border (which sends all round many ramifications in every direction) is nothing but the result of the melting of the snows of the northern polar cap. On this supposition the various phenomena which it presents can be very well explained, while the hypothesis of Professor SCHAEBERLE would lead to various difficulties.

Such are, for the moment, my ideas on this point. I recognize that they are, as yet, hypothetical in great part, and I am quite ready to modify them and to adopt other ones, if the latter are more accordant with observations. * * * * *

G. V. SCHIAPARELLI.

A note from Professor SCHIAPARELLI, dated June 7, acknowledges the receipt of some photographic copies of drawings of *Mars* made at the LICK Observatory in 1893. On these Professor SCHIAPARELLI remarks that he has recognized the doubling of the canals designated on his chart by the names *Ganges*, *Euphrates* and *Hydaspes*. The two first have been observed to be double on many occasions, but the doubling of *Hydaspes* is noticed for the first time.

E. S. H.

REMARKS ON THE SURFACE-MARKINGS OF *MARS* [BY J. M. SCHAEBERLE].

To the objections which Professor SCHIAPARELLI raises against my interpretations of the surface-markings on the planet *Mars*, I have the following to say: My views are based upon two striking and well observed facts which I interpret as follows:

First—The *observed* gradual obliteration of surface details with increasing distance from the center of the disk of *Mars* towards the circumference indicates the presence of a spherical shell of matter (atmospheric) above the general surface of the planet, which absorbs and obstructs some solar light which would otherwise be reflected from the surface.

Second—The *observed* corresponding increase in the brightness of the disk of *Mars* with increasing distance from the center to the circumference indicates that the reflecting particles of matter in this spherical shell (atmosphere) are of such a density and reflective power that more light is actually reflected from this shell than from the general surface of the planet.

If these interpretations are in accordance with the actual conditions of things *above* the surface of *Mars*, it would seem that